

**CLAIM AMENDMENTS**

1-76. (canceled)

77. (currently amended): ~~The membrane of claim 75~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of 0.01-100  $\Omega\cdot\text{cm}^2$  at at least one temperature between 220°C and 550°C.

wherein the metal or metal in the metal hydride is selected from the group consisting of Pd, PdAg, PdCu, Ti, LaNi<sub>5</sub>, TiFe and CrV<sub>2</sub>, V/Ni/Ti, V/Ni and V/Ti.

78. (currently amended): ~~The membrane of claim 75~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of 0.01-100  $\Omega\cdot\text{cm}^2$  at at least one temperature between 220°C and 550°C.

wherein the electronically-insulating proton conductor coating is selected from the group consisting of:

mesoporous zirconium phosphate pyrophosphate,  $\text{Zr}(\text{P}_2\text{O}_7)_{0.81}$ ;

$\text{Ba}_3\text{Ca}_{1.18}\text{Nb}_{1.82}\text{O}_{8.73}\cdot\text{H}_2\text{O}$ ;

$\text{Cs}_5\text{H}_3(\text{SO}_4)_4\cdot 0.5\text{H}_2\text{O}$ ;

a hydrate of  $\text{SnCl}_2$ ;

silver iodide tetratingstate  $\text{Ag}_{26}\text{I}_{18}\text{W}_4\text{O}_{16}$ ;

$\text{KH}_2\text{PO}_4$ ;

tetraammonium dihydrogen triselenate,  $(\text{NH}_4)_4\text{H}_2(\text{SeO}_4)_3$ ;

$\text{CsDSO}_4$ ;

$\text{CsH}_2\text{PO}_4$ ;

$\text{Sr}[\text{Zr}_{0.9}\text{Y}_{0.1}]\text{O}_{3-\delta}$ ;

a silica-polyphosphate composite containing ammonium ions;

$\text{La}_{0.9}\text{Sr}_{0.1}\text{Sc}_{0.9}\text{Mg}_{0.1}\text{O}_3$ ; and

$\text{BaCe}_{0.9-x}\text{Zr}_x\text{M}_{0.1}\text{O}_{3-\delta}$  where M is Gd or Nd and  $x = 0$  to  $0.4$ .

79. (currently amended): ~~The membrane of claim 75~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons is in the range of  $0.01$ - $100\ \Omega\cdot\text{cm}^2$  at at least one temperature between  $220^\circ\text{C}$  and  $550^\circ\text{C}$ .

wherein the electronically-insulating proton-conducting coating consists of

$\text{Ba}_3\text{Ca}_{1.18}\text{Nb}_{1.82}\text{O}_{8.73}\cdot\text{H}_2\text{O}$ ;

$\text{CsH}_2\text{PO}_4$ ;

$\text{Sr}[\text{Zr}_{0.9}\text{Y}_{0.1}]\text{O}_{3-\delta}$ ;

polyphosphate composite containing  $19.96\ \text{wt}\%$   $\text{NH}_4^+$ ,  $29.3\ \text{wt}\%$  P,  $1.51\ \text{wt}\%$  Si;

$\text{La}_{0.9}\text{Sr}_{0.1}\text{Sc}_{0.9}\text{Mg}_{0.1}\text{O}_3$ ; or

$\text{BaCe}_{0.9-x}\text{Zr}_x\text{M}_{0.1}\text{O}_{3-\delta}$  where M is Gd or Nd and  $x = 0$  to  $0.4$ .

80-81. (canceled)

82. (currently amended): ~~The membrane of claim 75~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase,

said coating having a thickness such that wherein the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about  $0.150 \Omega \cdot \text{cm}^2$ .

83-85. (canceled)

86. (currently amended): ~~The membrane of claim 85,~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

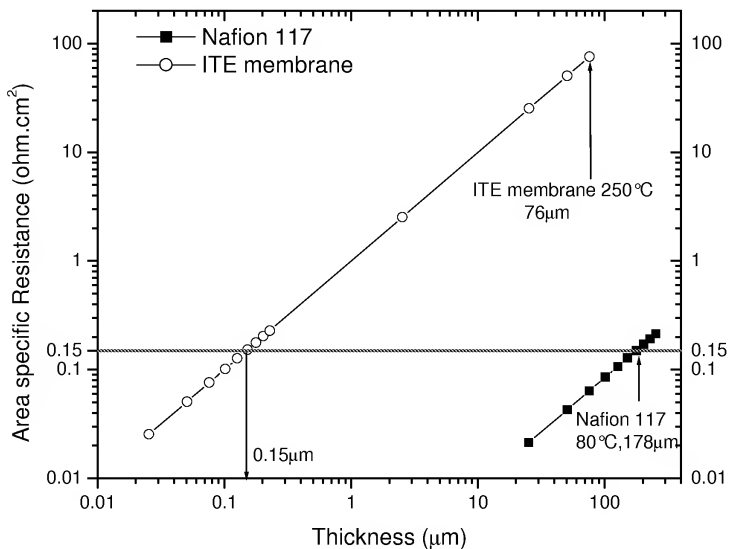


Figure 10:

wherein the metal or metal in the metal hydride is selected from the group consisting of Pd, PdAg, PdCu, Ti, LaNi<sub>5</sub>, TiFe and CrV<sub>2</sub>, V/Ni/Ti, V/Ni and V/Ti.

87. (currently amended): The membrane of claim 84 A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

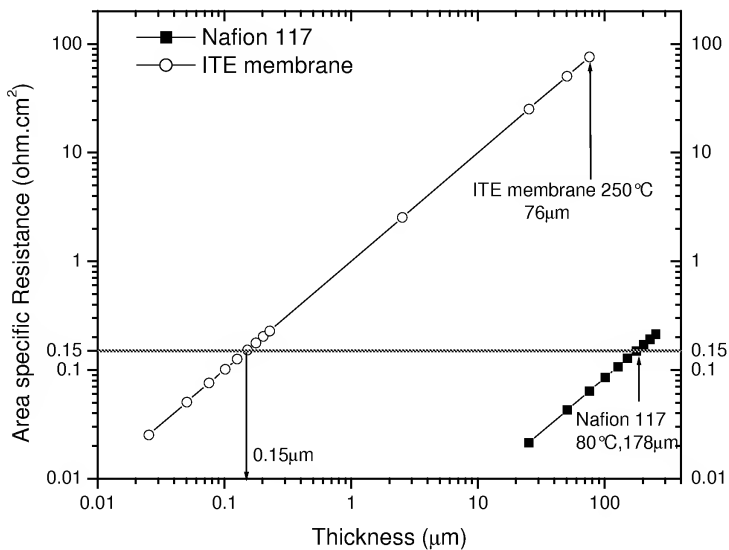


Figure 10:

wherein the electronically-insulating proton-conducting coating is selected from the group consisting of:

mesoporous zirconium phosphate pyrophosphate,  $\text{Zr}(\text{P}_2\text{O}_7)_{0.81}$ ;

$\text{Ba}_3\text{Ca}_{1.18}\text{Nb}_{1.82}\text{O}_{8.73}\cdot\text{H}_2\text{O}$ ;

$\text{C}_8\text{H}_3(\text{SO}_4)_4\cdot 0.5\text{H}_2\text{O}$ ;

a hydrate of  $\text{SnCl}_2$ ;

silver iodide tetratungstate  $\text{Ag}_{26}\text{I}_{18}\text{W}_4\text{O}_{16}$ ;

$\text{KH}_2\text{PO}_4$ ;

tetraammonium dihydrogen triselenate,  $(\text{NH}_4)_4\text{H}_2(\text{SeO}_4)_3$ ;

$\text{CsDSO}_4$ ;

$\text{CsH}_2\text{PO}_4$ ;

$\text{Sr}[\text{Zr}_{0.9}\text{Y}_{0.1}]\text{O}_{3-\delta}$ ;

a silica-polyphosphate composite containing ammonium ions;

$\text{La}_{0.9}\text{Sr}_{0.1}\text{Sc}_{0.9}\text{Mg}_{0.1}\text{O}_3$ ; and

$\text{BaCe}_{0.9-x}\text{Zr}_x\text{M}_{0.1}\text{O}_{3-\delta}$  where M is Gd or Nd and  $x = 0$  to 0.4.

88. (currently amended): ~~The membrane of claim 84, A proton-conducting membrane~~  
designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of  
a single metal or metal hydride support, wherein

one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the ASR for protons at at least one temperature between 220°C and 550°C is in the range shown for Nafion® 117 in Figure 10:

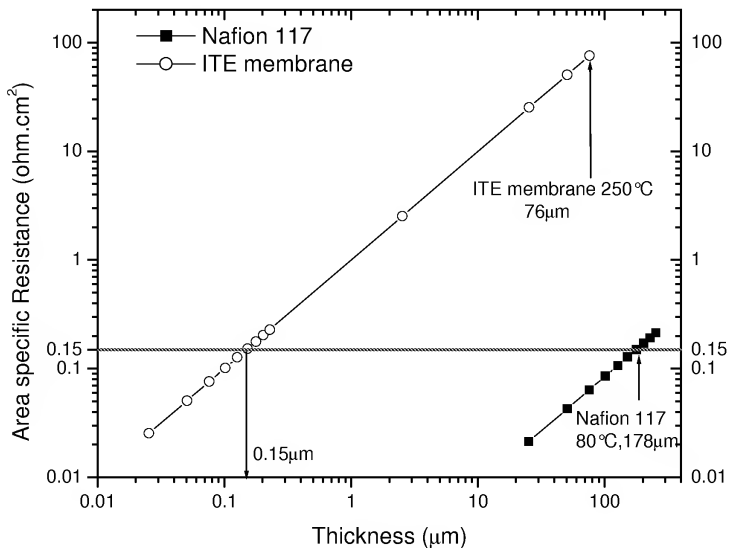
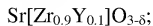
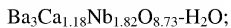


Figure 10:

wherein the electronically-insulating proton-conducting coating consists of



polyphosphate composite containing 19.96 wt%  $\text{NH}_4^+$ , 29.3 wt% P, 1.51 wt% Si;

$\text{La}_{0.9}\text{Sr}_{0.1}\text{Sc}_{0.9}\text{Mg}_{0.1}\text{O}_3$ ; or

$\text{BaCe}_{0.9-x}\text{Zr}_x\text{M}_{0.1}\text{O}_{3-\delta}$  where M is Gd or Nd and  $x = 0$  to 0.4.

89-90. (canceled)

91. (currently amended): ~~The membrane of claim 84~~ A proton-conducting membrane designed to serve as an electrolyte in a fuel cell, which membrane consists essentially of a single metal or metal hydride support, wherein



one or both faces of said support is coated with an electronically-insulating proton-conducting coating, which coating consists of an inorganic material that contains no liquid phase, said coating having a thickness such that the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about  $0.150 \Omega \cdot \text{cm}^2$  as shown for Nafion® 117 in Figure 10:

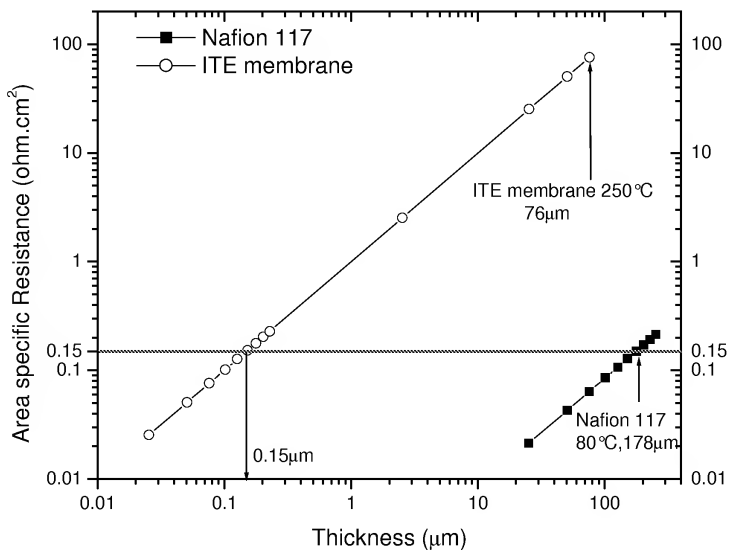


Figure 10.

wherein the area-specific resistance for protons at at least one temperature between 220°C and 550°C is about  $0.150 \Omega \cdot \text{cm}^2$ .